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ous structure; many species contain inulin. It does not appear as if any decisive conclusion may be drawn from the internal structure alone in regard to the question of classification, and it must not be forgotten that the occurrence of bicollateral mestome strands in the Campanulaceae is not common to all members of the family. Of far greater importance seems to be the morphological structure of the flower, and quite especially of the corolla and the stamens. This same view was held by GRAY, and we find in his *Synoptical flora* that the Lobeliaceae are kept separate from the Campanulaceae.—THEO. HOLM.

Anatomy of Palaeostachya.—In an interesting article HICKLING[8] gives an account of the cone of an important calamitean species. There are approximately eighteen sporangiophores and an equal number of sterile bracts. The former are axillary to the latter and are supplied by traces originating from the same node above the vascular strands, which pass off to the bracts. In spite of the fact that the sporangiophores are apparently in the axils of the bracts, the sporangiophore trace turns sharply upward in the secondary wood of the cone-axis through half an internode, to redescend afterward through the cortex to the sporangiophore. It appears from this investigation that the condition which is present in Calamostachys, in which the sporangiophore is placed high on the axis, is more primitive than that found in Palaeostachya, where it is apparently axillary; but nevertheless the sporangiophore in both these genera is an axillary structure and constitutes the ventral segment of its subtending, divided or undivided, bract. A very interesting statement on the part of the author, in view of the opinions recently expressed by CAMPBELL and SCOTT in regard to the presence of foliar gaps in the equisetal series, is the following: "It (the trace of the sterile bract) arises from the primary wood of that (the main) bundle, just where the carinal canal is obliterated and passes radially outward and slightly upward through the nodal secondary wood. . . . . *No gap is left in the main bundle.*" The italics are the reviewer's.—E. C. JEFFREY.

Seed development in Saxifraga.—JUEL[9] has published a rather lengthy account of seed development in *Saxifraga granulata*, including some reference to and a few figures of *Pyrola minor*. In Saxifraga the nucleus of the megaspore shows an apparently simple, homogeneous chromatin thread in synapsis stage, and the double chromosomes of later stages seem to arise, not from a splitting, but from a doubling of the thread. The number of chromosomes is about thirty. The arrangement of the conducting tissue and the course of the pollen tube are described. No plasma sheath can be demonstrated about the male nuclei in the pollen tube, but a thin sheath is evident after the nuclei are discharged. The male cells pass into a synergid, and probably the tube nucleus also. The definitive endosperm nucleus, which is fertilized by the second male nucleus, divides near the lower end of the sac, and following this division the protoplasm is separated by a plasma membrane into a large upper and a small lower cell. After two more divisions in the lower cell, walls appear, and four basal endosperm cells are formed. These elongate and divide again to form eight cells with dense contents which form a cap over the lower end of the more extensive endosperm tissue above. This lower tissue, while not so extensive, is similar in origin to that recently described in the Pontederiaceae. After examining the food-stuffs of the seed, the author closes with a description of a special tissue formed from the funiculus, which serves to separate the seed from the placenta.—W. C. COKER.

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[8] HICKLING, GEORGE, The anatomy of *Palaeostachya vera*. Annals of Botany 21:369–386. *pls. 32, 33.* 1907.

[9] JUEL, H. O., Studien über die Entwicklungsgeschichte von *Saxifraga granulata*. Nova Acta Reg. Soc. Sci. Upsal. IV. 1:1–41. *pls. 1–4. figs. 6.* 1907.

Roots of aroids.—LINSBAUER[10] has studied the growth and geotropism of the aerial roots of a large number of aroids. These are often dimorphic; some roots are long and strong, the so-called *Nährwurzel* (here called long roots); others are more slender, usually horizontal and tufted, the *Haftwurzel* (here called short roots). Of these only a few have been sufficiently examined since the rise of the statolith theory of geoperception. He extends SACHS'S observation as to the great length of the growing zone; in long roots for most it lies between 20 and 50^{mm} with a minimum of $5–10^{mm}$ and a maximum of 90^{mm}; in short roots, however, it runs from $3–14^{mm}$. Yet the former grow less rapidly than the latter; nor do either grow daily more *in toto* than ordinary soil roots, and their growing zone is not so sharply marked. The typical long roots are mostly geotropic, though only weakly so, for in a whole day they do not curve from the horizontal to the vertical; and many, even under the most advantageous external conditions, are wholly or periodically ageotropic; typical short roots are always ageotropic.

When the roots are not dimorphic (as in Anthurium and some other genera), they are ageotropic. Both sorts have a well-developed columella in the root cap, which is furnished, so long as they are growing, with statolith starch, quite irrespective of their geotropic or ageotropic behavior. This fact LINSBAUER contents himself with stating and does attempt to use it against the theory or to reconcile it therewith.—C. R. B.

Production of diastase.—EISENBERG has attacked anew the problem of the regulatory production of diastase, determining the effect of various factors on its formation.[11] This was estimated by the effectiveness of a given solution in converting into sugar a standard solution of soluble starch. The results coincide in large measure with those of previous observers and strengthen the belief that diastase is formed in variable amounts according as other metabolic factors vary. Thus more diastase is produced in active, less in sluggish, germination. At the optimum temperature for growth diastase production is greatest. In germinating

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[10] LINSBAUER, K., Ueber Wachstum und Geotropismus der Aroideen-Luftwurzeln. Flora 97:267–297. 1907.

[11] EISENBERG, ELFRIDE, Beiträge zur Kenntnis der Entstehungsbedingungen diastatischer Enzyme in höheren Pflanzen. Flora 97:347–374. 1907.